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EXAMINER	
MUMMERT, STEPHANIE KANE	
ART UNIT	**PAPER NUMBER**
1637	

DATE MAILED: 11/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/735,395	GRUBER ET AL.	
	Examiner	Art Unit	
	Stephanie K. Mummert, Ph.D.	1637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *25 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) *1,13,18,57,61,87,88,103,112,130 and 149* is/are pending in the application.

4a) Of the above claim(s) *103,130 and 149* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1,13,18,57,61,87-88 and 112* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 12/12/03
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 1, 13, 18, 57, 61, 87-88 and 112 in the reply filed on August 25, 2006 is acknowledged.

2. Claims 103, 130 and 149 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on August 25, 2006.

3. Claims 1, 13, 18, 57, 61, 87-88 and 112 are pending and will be examined.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 13, 18, 57, 61 and 87 are rejected under 35 U.S.C. 102(b) as being anticipated by Holmlin et al. (Angew Chem Int Ed, 2000, vol. 39, no. 19, p. 3503-3506). Holmlin teaches a method for forming two-dimensional and three-dimensional microstructures in which the components are biological cells, using optical tweezers (p. 3503, col. 1, top paragraph).

With regard to claim 1, Holmlin teaches a method of configuring and tracking all array of probes comprising:

a) generating at least two movable optical traps within a vessel (p. 3504, col. 1, where it is noted that optical tweezers can be used to hold, orient and move objects; Figure 1, especially c), where

it is further noted that multiple optical traps are generated to orient more than one microsphere or molecule; p. 3506, 'experimental section' heading, bottom paragraph, where the specifics of how each optical trap was generated is described);

b) providing at least two probes within the vessel (Figure 2, where multiple 'probes' are oriented relative to one another);

c) selecting at least two of the probes for inclusion in an array of probes contained within the optical traps (Figure 2, where multiple 'probes', including microspheres coated in lectins and erythrocyte cells are incorporated into the 'array' of probes within the optical traps);

d) trapping each of the selected probes with one of the optical traps to configure the array of probes contained within the optical traps (Figure 1, where the process of trapping and configuring is schematically depicted; Figure 2, where specific probes of lectins and erythrocytes are shown); and,

e) tracking the position of at least one of the trapped probes in the array by monitoring the position of the optical trap which contains it (Figure 2, where the location of the traps is monitored by microscopy).

With regard to claim 13, Holmlin teaches an embodiment of claim 1, wherein the trapped probe is a chemical compound (Figure 1, a) and b) where microspheres are coated with WGA, a lectin that binds NeuAc and GlcNAc, sugars which are on the surface of cells in a), and where the lectin or the carbohydrates are chemical compounds).

With regard to claim 18, Holmlin teaches an embodiment of claim 1 wherein the trapped probe is an oligonucleotide, a polynucleotide, a protein, a polysaccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregations of cells, a

microorganism, a peptide, cDNA, RNA or combinations thereof (Figure 1, a) and b) where microspheres are coated with WGA, a lectin that binds NeuAc and GlcNAc, and which represent proteins, polysaccharides, ligands and cells).

With regard to claim 57, Holmlin teaches a method of assaying biological material comprising:

a) generating at least two movable optical traps within a vessel (p. 3504, col. 1, where it is noted that optical tweezers can be used to hold, orient and move objects; Figure 1, especially c), where it is further noted that multiple optical traps are generated to orient more than one microsphere or molecule; p. 3506, ‘experimental section’ heading, bottom paragraph, where the specifics of how each optical trap was generated is described);

b) providing a fluid media in the vessel (p. 3506, ‘experimental section’ heading, where the experiments were carried out on ‘sample suspensions’, which indicates that the interactions occurred in fluid media, Figures 2-4 also indicate that the interactions occur in liquid under microscopy);

c) providing at least two probes for biological materials within the fluid media (Figure 2, where multiple ‘probes’ are oriented relative to one another);

d) selecting at least two of the probes for inclusion in an array (Figure 2, where multiple ‘probes’, including microspheres coated in lectins and erythrocyte cells are incorporated into the ‘array’ of probes within the optical traps);

e) trapping each of the selected probes with one of the optical traps; introducing into the vessel at least one target comprised of a biological material (Figure 1, where the process of trapping and

configuring is schematically depicted; Figure 2, where specific probes of lectins and erythrocytes are shown); and,

f) determining the reaction or lack thereof, of each of the trapped probes with each of the targets (Figure 2, where the location of the probes is monitored by microscopy).

With regard to claim 61, Holmlin teaches an embodiment of claim 57, wherein the trapped probe is an oligonucleotide, a polynucleotide, a protein, a polysaccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregations of cells, a microorganism, a peptide, cDNA, RNA or combinations thereof (Figure 1, a) and b) where microspheres are coated with WGA, a lectin that binds NeuAc and GlcNAc, and which represent proteins, polysaccharides, ligands and cells).

With regard to claim 87, Holmlin teaches a method of configuring an array of probes comprising:

a) generating at least two movable optical traps within a vessel (p. 3504, col. 1, where it is noted that optical tweezers can be used to hold, orient and move objects; Figure 1, especially c), where it is further noted that multiple optical traps are generated to orient more than one microsphere or molecule; p. 3506, 'experimental section' heading, bottom paragraph, where the specifics of how each optical trap was generated is described);

b) providing at least two probes within the vessel (Figure 2, where multiple 'probes' are oriented relative to one another); and,

c) configuring an array of at least two probes by selecting each probe with one of the optical traps (Figure 2-4 where two and three dimensional arrays of probes are configured).

6. Claims 1, 87-88 and 112 are rejected under 35 U.S.C. 102(b) as being anticipated by Grier et al. (US Patent 6,055,106; April 2000). Grier teaches an apparatus and method for manipulating particles using optical traps (Abstract).

With regard to claim 1, Grier teaches a method of configuring and tracking all array of probes comprising:

a) generating at least two movable optical traps within a vessel (col. 1, lines 24-47, where the method is directed to the generation of a plurality of optical traps; col. 5, lines 12-18, where it is noted that the optical tweezer system can be used to actively move particles relative to one another);

b) providing at least two probes within the vessel (col. 1, lines 9-18, where the method is directed to trapping small dielectric particles or other materials, and col. 1, lnes 48-57, where it is noted that an object of the invention includes chemical and biosensor arrays, facilitation of combinatorial chemistry applications and manipulation of biological materials);

c) selecting at least two of the probes for inclusion in an array of probes contained within the optical traps (col. 1, lines 24-47, where the method is directed to the generation of a plurality of optical traps; col. 1, lines 62-66, where the method is directed to the construction of a spatial array of optical traps for manipulation of particles);

d) trapping each of the selected probes with one of the optical traps to configure the array of probes contained within the optical traps (col. 4, lines 29-30 and lines 58-65, where embodiments of arbitrary arrays of trapped particles are described; Figure 7, where a 4x4 array of beams is used to trap sixteen silica spheres in sixteen optical tweezers); and,

e) tracking the position of at least one of the trapped probes in the array by monitoring the position of the optical trap which contains it (col. 2, lines 41-45, where an object of the invention is to create multiple independently steered optical traps; col. 5, lines 38-52).

With regard to claim 87, Grier teaches a method of configuring an array of probes comprising:

a) generating at least two movable optical traps within a vessel (col. 1, lines 24-47, where the method is directed to the generation of a plurality of optical traps; col. 5, lines 12-18, where it is noted that the optical tweezer system can be used to actively move particles relative to one another);

b) providing at least two probes within the vessel (col. 1, lines 9-18, where the method is directed to trapping small dielectric particles or other materials, and col. 1, lnes 48-57, where it is noted that an object of the invention includes chemical and biosensor arrays, facilitation of combinatorial chemistry applications and manipulation of biological materials); and,

c) configuring an array of at least two probes by selecting each probe with one of the optical traps (Figure 7, where a 4x4 array of beams is used to trap sixteen silica spheres in sixteen optical tweezers).

With regard to claim 88, Grier teaches a method of configuring and reconfiguring an array of probes comprising:

a) directing a focused beam of light at a phase patterning optical element to form a plurality of beamlets emanating from the phase patterning optical element (col. 4, lines 29-65, specifically lines 29-42, where light passes through a diffractive optical element and a plurality of beams are created);

b) directing the plurality of beamlets at the back aperture of a focusing lens to pass the beamlets through the focusing lens and converge the beamlets emanating from the focusing lens to generate movable optical traps within a vessel (col. 3, lines 36-40, where one or more beams of light are projected into the center of a back aperture; col. 4, line 66 to col. 5, line 7);

c) providing a plurality of probes within the vessel (col. 1, lines 9-18, where the method is directed to trapping small dielectric particles or other materials, and col. 1, lnes 48-57, where it is noted that an object of the invention includes chemical and biosensor arrays, facilitation of combinatorial chemistry applications and manipulation of biological materials);

d) selecting at least two of the probes for inclusion in the array of probes contained within the optical traps (col. 1, lines 24-47, where the method is directed to the generation of a plurality of optical traps; col. 1, lines 62-66, where the method is directed to the construction of a spatial array of optical traps for manipulation of particles);

e) trapping each of the selected probes with one of the optical traps to configure the array of probes contained within the optical traps (col. 4, lines 29-30 and lines 58-65, where embodiments of arbitrary arrays of trapped particles are described; Figure 7, where a 4x4 array of beams is used to trap sixteen silica spheres in sixteen optical tweezers); and,

f) altering the position of at least one of the probes contained within the optical traps by moving the optical trap containing the probe to reconfigure the array of probes contained within the optical traps (col. 5, lines 12-18, where it is noted that the optical tweezer system can be used to actively move particles relative to one another).

With regard to claim 112, Grier teaches an embodiment of claim 2, wherein the movement of the trapped probes are tracked based on pre-determined movement of each optical

trap caused by encoding the phase patterning optical element (col. 2, lines 41-45, where an object of the invention is to create multiple independently steered optical traps; col. 5, lines 38-52).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 13, 18, 57 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grier et al. (US Patent 6,055,106; April 2000) in view of Ulmer et al. (US Patent 6,055,106; April 2000). Grier teaches an apparatus and method for manipulating particles using optical traps (Abstract).

With regard to claim 57, Grier teaches a method of assaying biological material comprising:

a) generating at least two movable optical traps within a vessel (col. 1, lines 24-47, where the method is directed to the generation of a plurality of optical traps; col. 5, lines 12-18, where it is noted that the optical tweezer system can be used to actively move particles relative to one another);

b) providing a fluid media in the vessel (col. 1, lines 19-23, where the trapped particle or probe is immersed in a fluid medium);

c) providing at least two probes within the fluid media (col. 1, lines 9-18, where the method is directed to trapping small dielectric particles or other materials, and col. 1, lnes 48-57, where it is noted that an object of the invention includes chemical and biosensor arrays, facilitation of combinatorial chemistry applications and manipulation of biological materials);

d) selecting at least two of the probes for inclusion in an array (col. 1, lines 24-47, where the method is directed to the generation of a plurality of optical traps; col. 1, lines 62-66, where the method is directed to the construction of a spatial array of optical traps for manipulation of particles);

e) trapping each of the selected probes with one of the optical traps (col. 4, lines 29-30 and lines 58-65, where embodiments of arbitrary arrays of trapped particles are described; Figure 7, where a 4x4 array of beams is used to trap sixteen silica spheres in sixteen optical tweezers).

With regard to claim 57, Grier does not explicitly teach the steps:

c) providing at least two probes for biological materials, e) introducing into the vessel at least one target comprised of a biological material, and f) determining the reaction or lack thereof, of each of the trapped probes with each of the targets.

Grier also does not explicitly teach the specific types of biological and/or chemical targets and probes which are useful in the practice of the invention. Ulmer teaches the use of optical traps in methods of biological, biochemical or chemical processes (Abstract).

With regard to claim 57, Ulmer teaches the steps:

c) providing at least two probes for biological materials (col. 4, lines 15-24, where each trapped probe can be a different chemical or biological or biochemical compound or agent),

e) introducing into the vessel at least one target comprised of a biological material (col. 7, lines 28-44, where the trapped probe is an oligonucleotide or nucleic acid fragment and the particle is moved along until it meets a fragment in the target which is capable of specifically binding to the probe), and

f) determining the reaction or lack thereof, of each of the trapped probes with each of the targets (col. 7, lines 28-44).

With regard to claim 13, Ulmer teaches an embodiment of claim 1, wherein the trapped probe is a chemical compound (col. 4, lines 15-24, where each trapped probe can be a different chemical or biological or biochemical compound or agent).

With regard to claim 18, Ulmer teaches an embodiment of claim 1 wherein the trapped probe is an oligonucleotide, a polynucleotide, a protein, a polysaccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregations of cells, a microorganism, a peptide, cDNA, RNA or combinations thereof (col. 7, lines 28-35, where the trapped probe is an oligonucleotide or nucleic acid fragment).

With regard to claim 61, Ulmer teaches an embodiment of claim 57, wherein the trapped probe is an oligonucleotide, a polynucleotide, a protein, a polysaccharide, a ligand, a cell, an antibody, an antigen, a cellular organelle, a lipid, a blastomere, an aggregations of cells, a microorganism, a peptide, cDNA, RNA or combinations thereof (col. 7, lines 28-35, where the trapped probe is an oligonucleotide or nucleic acid fragment).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the teachings of Ulmer into the method of optical trapping taught by Grier to arrive at the claimed invention with a reasonable expectation for

success. Ulmer discloses the use of optical traps in methods of biological, biochemical or chemical processes. As taught by Ulmer, "Examples of chemical, biochemical and/or biological processes that might be implemented in accordance with the invention include the following: oligonucleotide synthesis and sequencing, carbohydrate synthesis and sequencing, combinatorial library synthesis and screening, conventional (i.e., Sanger or Maxam-Gilbert) DNA sequencing, or single-molecule DNA sequencing" (Abstract). In fact, it is also a directly stated object of Grier to "provide an improved method and system for establishing a plurality of optical traps for a variety of commercial applications relating to manipulation of small particles" and this includes chemical and biochemical sensor arrays, facilitation of combinatorial chemistry applications and the manipulation of biological materials (col. 1, lines 48-57). Therefore, one of ordinary skill in the art at the time the invention was made would have been motivated to extend the arrays of optical traps taught by Grier to include the specific types of biological targets and probes taught by Ulmer to achieve the manipulation of biological targets as described generally by Grier with a reasonable expectation for success.

Conclusion

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephanie K. Mummert, Ph.D. whose telephone number is 571-272-8503. The examiner can normally be reached on M-F, 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on 571-272-0782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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